

### **REMARKS/ARGUMENTS**

In response to the Examiner's Office Action of February 21, 2006 the Applicant respectfully submits the accompanying Terminal Disclaimer, Amendment to the abstract and claims and the below Remarks.

#### ***Regarding Amendment***

In the Amendment:

the specification has been amended at Page 1: line 1 has been deleted and replaced by a paragraph entitled "Cross-Reference to Related Application" (at line 5).

the abstract is amended to replace the term "comprises" with --has-- and the restrict the length to less than 150 words;

independent claims 1, 19 and 38 are amended to specify that the heater element is configured to require the claimed heat energy difference to eject a drop, and that this configuration together with a configuration of the nozzle and an inlet through which the ejectable liquid is supplied to the nozzle which results in the outgoing heat energy due to the net effect of the ejected and replacement quantities of ejectable liquid being substantially equal to the amount of heat energy added to the ejectable liquid by the heater element, results in the claimed temperature after collapse of the gas bubble. Support for this amendment can be found, for example, at page 20, line 5-page 23, line 26 of the present specification;

dependent claims 9, 28 and 45 are cancelled; and

dependent claims are unchanged.

It is respectfully submitted that the above amendments do not add new matter to the present application.

#### ***Regarding Specification***

It is respectfully submitted that the above-described amendment of the abstract provides the correction required by the Examiner.

#### ***Regarding Provisional Non-Statutory Double Patenting Rejections***

With respect to the provisional non-statutory double patenting rejection of pending claims 1-54 over claims 1, 2, 5-20, 23-39, 42 and 44-54 of copending Application No. 10/728,779 in view of Dunn (US 4,982,199), a terminal disclaimer in compliance with 37 C.F.R. 1.321(c) is being submitted herewith; the present application and Application No. 10/728,779 being commonly owned by the Applicant.

#### ***Regarding Claim Objections and 35 USC 112, second paragraph Rejections***

It is respectfully submitted that the above-described amendment cancelling claims 9, 28 and 45, overcomes the Examiner's objections and rejections with respect to the subject matter claimed therein.

***Regarding 35 USC 103(a) Rejections***

***Regarding Kubby (US 5,706,041) in view of Dunn and Silverbrook (US 5,856,836)***

It is respectfully submitted that the subject matter of above-described amended independent claims 1, 19 and 38, and claims dependent therefrom, is not taught or suggested by Kubby in view of Dunn and Silverbrook, for at least the following reasons.

In the present invention, the printhead is configured so that the energy applied to a heater element 10 eject a drop 16 of ink 11 is removed from the printhead by a combination of the heat removed by the ejected drop itself and the ink that is replaced within the printhead from the ink reservoir.

This is achieved by configuring the heater elements so that the energy the heater element requires to eject the drop is substantially equal to the heat energy difference between the ejected drop and an equivalent volume of replacement ink, and by configuring the nozzles 3 and the inlet passages 9 so that the outgoing heat energy due to the net effect of the ejected and replacement quantities of ink is substantially equal to the heat added by the heater elements.

In this way, complete self-cooling is obtained such that the maximum temperature of the ink in a particular nozzle chamber 7 is at least 10 degrees C below its boiling point when the heating element is not active. This degree of self-cooling eliminates the possibility of undesired ejection of the ink due to fluctuations in the ambient and printhead temperatures (see page 20, line 5-page 23, line 26 of the present specification). Independent claims 1, 19 and 38 have been amended to specify these feature of the present invention.

On the other hand, as admitted by the Examiner, Kubby does not teach that the energy the heater element requires to eject the drop is substantially equal to the heat energy difference between the ejected drop and an equivalent volume of replacement ejectable liquid, such that the temperature of the bubble forming liquid is at least 10 degrees C below its boiling point after heater element activation. To this end, the Examiner cites Dunn as purportedly teaching these features.

However, Dunn merely discloses prewarming the ink within the firing chamber so that more of the ink is vaporized during vapour bubble formation, which results in larger drops being ejected. Dunn specifically teaches that the higher the temperature the ink is prewarmed to, the larger the ejected drops (see col. 3, line 24-col. 4, line 28 and col. 5, line 38-col. 6, line 2 of Dunn).

Accordingly, one of ordinary skill in the art would clearly understand from the disclosure of Dunn that prewarming temperatures which bring the ink within 10 degrees C of its boiling point are to be used when larger drops are desired. Thus, Dunn does not teach or suggest configuring the disclosed firing resistors, firing nozzles and capillary tubes (see col. 2, lines 31-51 of Dunn) so that the temperature of the ink is at least 10 degrees C below its boiling point when the firing resistors are not activated for firing.

Silverbrook does not make up for this deficiency in Kubby and Dunn, because Silverbrook similarly does not teach or suggest configuring the heater elements, nozzles and ink supply inlets so that the temperature of the ink is at least 10 degrees C below its boiling point when the heater elements are not activated for drop ejection.

Thus, the subject matter of amended independent claims 1, 19 and 38, and claims 2-18, 20-37 and 39-54 dependent therefrom, is taught or suggested by Kubby either taken alone or in combination with Dunn and/or Silverbrook.

*Regarding Kubby, Dunn and Silverbrook further in view of other cited references*

It is respectfully submitted that the subject matter of dependent claims, is not taught or suggested by Kubby, Dunn and Silverbrook further in view of one or more of the other cited references in Feinn et al. (US 6,543,879), Watrobski et al. (US 5,742,307), Silverbrook (US 5,841,452), Mitani et al. (US 5,831,648), Kashino et al. (US 5,534,898), Komuro (US 4,965,594), Chan (5,710,070) and Pan et al. (US 4,931,813), for at least the above discussed reasons and because none of the other cited references teach or suggest configuring the heater elements, nozzles and ink supply inlets so that the temperature of the ink is at least 10 degrees C below its boiling point when the heater elements are not activated for drop ejection.

It is respectfully submitted that all of the Examiner's rejections have been traversed. Accordingly, it is submitted that the present application is in condition for allowance and reconsideration of the present application is respectfully requested.

Very respectfully,

Applicant:



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